U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET E00057EN	TCDS NUMBER E00057EN REVISION 4* DATE: June 26, 2002 Rolls-Royce Deutschland Ltd & Co KG MODELS: BR700-710A1-10 BR700-710A2-20 BR700-710C4-11

Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E00057EN) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations, provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

TYPE CERTIFICATE (TC) HOLDER Rolls-Royce Deutschland Ltd & Co KG
(formerly Rolls-Royce Deutschland GmbH, formerly BMW Rolls-Royce GmbH)
Eschenweg 11
D-15827 Dahlewitz
Germany

I. MODELS	**BR700-710A1-10**	**BR700-710A2-20**	**BR700-710C4-11**	
TYPE	Two spool axial flow engine consisting of a single stage fan, a ten stage axial flow compressor, an annular combustion chamber, a two stage axial flow high pressure turbine, a two stage axial flow low pressure turbine, an accessory gearbox, a thrust reverser and a Full Authority Digital Engine Control (FADEC).			
RATINGS (See NOTE 5)				
Maximum Continuous Thrust lbf/kN (See NOTE 18)	14,450/64.3	14,450/64.3	14,450/64.3	
Take-off Thrust, lbf/kN (See NOTE 18)	14,750/65.6	14,750/65.6	15,385/68.4	
EQUIPMENT	In accordance with the Type Design Definition. Approved equipment is listed in BRR report E-TR150/95(FR), Issue 3 “Engine Equipment Classification”; or later approved issues, for BR700-710A1-10; and in BRR report E-TR427/96(FR), Issue 1, “Engine Equipment Classification,” or later approved issues for BR700-710A2-20; and in RRD report E-TR466/01-(FR)-ISS02 "Engine Equipment Classification," or later approved issues, for BR700-710C4-11.			
OVERALL DIMENSIONS (mm/in)				
Length	4669/183.8	4669/183.8	4660/183.5	
Diameter	1820/71.6	1820/71.6	1785/70.3	
WEIGHT (DRY) (kg/lbs)				
	1851.2	1891	1818.4	
	4081.2	4168.9	4008.9	

LEGEND: "- -" INDICATES "SAME AS PRECEDING MODEL"
"---" INDICATES "DOES NOT APPLY"
NOTICE: SIGNIFICANT CHANGES ARE BLACK LINED IN THE LEFT MARGIN.

CERTIFICATION BASIS

FAR 33, effective February 1, 1965, as amended by 33-1 through 33-15, FAR 33.76 as amended by 33-20 and FAR 33.78 as amended by 33-19 and FAR 34.

MODEL	APPLICATION DATE	TYPE CERTIFICATE ISSUED	TYPE CERTIFICATE CANCELLED
BR700-710A1-10	Oct. 05, 1993	Sept. 16, 1996	
BR700-710A2-20	Sept. 07, 1994	Aug. 1, 1997	
BR700-710C4-11	Feb.28, 2001	June 26, 2002	

PRODUCTION BASIS

IMPORT REQUIREMENTS

To be considered for installation on United States registered aircraft, each engine to be exported to the United States shall be accompanied by a certificate of airworthiness for export, or certifying statement endorsed by the exporting cognizant civil airworthiness authority, which contains the following language:

These engines conform to the United States type design (Type Certificate Number E00057EN) and are in a condition for safe operation.

These engines have been subjected by the manufacturer to a final operational check and are in a proper state of airworthiness.

Reference FAR Section 21.500, which provides for the airworthiness acceptance of aircraft engines or propellers manufactured outside of the United States for which a United States type certificate has been issued.

Additional guidance is contained in FAA Advisory Circular 21-23, Airworthiness Certification of Civil Aircraft, Engines, Propellers, and Related Products, imported into the United States.

NOTES

NOTE 1. Maximum Rotational Speeds:

	BR700-710A1-10	BR700-710A2-20	BR700-710C4-11
Low Pressure Turbine N1 (%)			
-Maximum Take-off (See NOTE 18)	101.1	102.1	101.1
-Maximum Continuous	101.0	102.1	101.0
-Maximum Overspeed (20 sec.)	101.5	102.5	101.5
-Reverse Thrust (max. 30 sec.)	70	70	70
-Acceleration to Takeoff with Cross Winds above 20 kts	66*	66*	66*
-Stabilized engine operation is not approved for aircraft static on the ground	between 66 and 80**	between 66 and 80**	between 66 and 80**
High Pressure Turbine N2 (%)			
-Maximum Take-off (See NOTE 18)	99.6	99.6	99.6
- Maximum Continuous	98.9	98.9	98.9
-Maximum Overspeed (20 sec.)	99.8	99.8	99.8

*Until a forward speed of 20 kts is reached. Above 20 kts forward speed, a slam acceleration to take-off is required.

** Acceleration or deceleration through this band must not exceed 10 seconds (forward thrust only).

100% N1 equals 7431 RPM

100% N2 equals 15898 RPM

NOTE 2. **Temperature Limits**

Temperature limits listed below are the same for both BR700-710A1-10, BR700-710A2-20, and BR700-710C4-11, except where noted.

Turbine Gas Temperature (Trimmed) **°C/°F**	
Take-off (See NOTE 18)	900/1652
Maximum Continuous	860/1580
Maximum overtemperature (20 sec.)	905/1661
Maximum prior to start	150 /302
Starting on ground	700 /1292
Starting in flight	850 /1562
Oil temperatures (°C/°F)	
Minimum for Starting	-30/-22**
Minimum for Accel-eration for take-off	20/68
Maximum	160/320
Fuel Temperatures (°C/°F)	
LP Pump Inlet, Max.	54/129
HP Pump Outlet, Max.	158°C/316°F (165°C/329°F)*

* Temporarily permitted for a period of not more than 15 minutes.

** -40°C/-40°F for BR700-710A2-20. For temperatures below -30°C/-22°F see OI-710-2BR Operating Instructions.

NOTE 3. **Fuel and Oil Pressure Limits**

Fuel and oil pressure limits are the same for both BR700-710A1-10, BR700-710A2-20, and BR700-710C4-11 except where noted.

Fuel Pressure	Minimum permissible fuel pressure at LP fuel pump inlet:	34.5 kPa/5.0 psig
Differential Oil Pressures:	Minimum Acceptance for Flight in the Range:	
	Idle to 72.3% N2:	241.2 kPa/35 psid
	72.3% N2 to 90% N2:	straight line interpolation from 241.2 kPa/35 psid to 310.3 kPa/45 psid
	Above 90% N2:	310.3 kPa/45 psid
	Minimum to Complete Flight:	
	Idle to 72.3% N2:	172.3 kPa/25 psid
	72.3% N2 to 90% N2:	straight line interpolation from 172.3 kPa/25 psid to 241.2 kPa/35 psid
	Above 90% N2:	241.2 kPa/35 psid

NOTE 4. **Bleed Extraction:**

EPR = P50/P20: The amounts of bleed extraction from stages 5 and 8, respectively, are related to the core entry mass flow, W26. The amount of fan bleed extraction is related to the fan entry mass flow, W1A.

For BR700-710A1-10:

Power Range	Normal Flow (%)			Maximum Flow (%)		
	Stage 5	Stage 8	Fan	Stage 5	Stage 8*	Fan
Idle to 1.06 EPR		7.8		3.0	12.1	0.6
1.06 to 1.3 EPR	4.4	4.2	0.2	8.3	7.9	1.6
Above 1.3 EPR	4.3		0.4	8.5	8.0	1.8

*** Stage 8 bleed is cleared for operation up to and including Maximum Continuous rating.**

For BR700-710A2-20:

Power Range	Normal Flow (%)			Maximum Flow (%)		
	Stage 5	Stage 8	Fan	Stage 5	Stage 8*	Fan
Idle to 1.06 EPR		7.8	0.4	3.0	12.1	0.6
1.06 to 1.3 EPR	4.4	4.2	0.4	8.3	7.9	0.9
Above 1.3 EPR	4.3		0.4	8.5	8.0	1.1

*** Stage 8 bleed is cleared for operation up to and including Maximum Continuous rating.**

For BR700-710C4-11:

Power Range	Normal Flow (%)			Maximum Flow (%)		
	Stage 5	Stage 8	Fan	Stage 5	Stage 8*	Fan
Idle to 1.06 EPR		7.7		3.0	12.0	0.6
1.06 to 1.3 EPR	4.3	4.1	0.2	8.2	7.8	1.6
Above 1.3 EPR	4.2		0.4	8.3	7.8	1.8
*Stage 8 bleed is cleared for operation up to and including Maximum Continuous rating.						

NOTE 5. The ratings are defined at sea level ISA standard day conditions and a defined test bed configuration for the air intake and exhaust systems with all optional bleeds closed and the aircraft service equipment drives unloaded, at a fuel low heat value of 43179 kJ/kg (22721 CHU/kg).

NOTE 6. **ACCESSORY DRIVE PROVISIONS for BR700-710A1-10:**

	Direction* of Rotation	Transmission Ratio	Torque daNcm (lbs/in)	Weight kg (lbs)	Static Overhang Moment daNcm (lbs/in)	Maximum Power Extraction kW (hp)
Main Engine Fuel Pump including Fuel Metering Unit	CW	0.530	2670 (2363)	20.5 (45.2)	395.45 (350)	26.9 (36.1)
Hydraulic Pump No. 1	CCW	0.270	4180 (3700)	8.91 (19.64)	81 (71.7)	18.6 (24.9)
Hydraulic Pump No. 2	CCW	0.275	4180 (3700)	8.91 (19.64)	81 (71.7)	18.6 (24.9)
Generator	CW	0.520	4125 (3651)	32.61 (71.9)	564.92 (500)	32.7 (43.9)
Generator FADEC[1]	CW	1.998		1.0 (2.2)	10 (8.85)	1.0 (1.34)
Starter[2]	CCW	0.986	8470 (7497)	15.56 (34.3)	227 (201)	
Oil Pump	CCW	0.408	518 (458)	9.07 (20)	66 (58.4)	3.2 (4.3)
*CW: clockwise; CCW: counterclockwise, looking normal to pad along shaft						

1) Dedicated Generator (PMA) 2) Air Turbine Starter

NOTE 6. (Cont.) **ACCESSORY DRIVE PROVISIONS for BR700-710A2-20:**

	Direction* of Rotation	Transmission Ratio	Torque daNcm (lbs/in)	Weight kg (lbs)	Static Overhang Moment daNcm (lbs/in)	Maximum Power Extraction kW (hp)
Main Engine Fuel Pump including Fuel Metering Unit	CW	0.530	2670 (2363)	20.5 (45.2)	395.45 (350)	26.9 (36.1)
Hydraulic Pump	CCW	0.335	3051 (2700)	6.57 (14.5)	61 (54)	10.3 (13.8)
Generator No. 1	CW	1.083	2830 (2505)	20.0 (44.2)	325 (287.6)	52 (69.7)
Generator No. 2	CCW	1.080	2830 (2505)	20.0 (44.2)	325 (287.6)	52 (69.7)
Generator FADEC[1]	CW	1.998		1.0 (2.2)	10 (8.85)	1.0 (1.34)
Starter[2]	CCW	0.986	8470 (7497)	15.56 (34.3)	227 (201)	
Oil Pump	CCW	0.421	518 (458)	9.07 (20)	66 (58.4)	3.2 (4.3)
*CW: clockwise; CCW: counterclockwise, looking normal to pad along shaft						

1) Dedicated Generator (PMA) 2) Air Turbine Starter

ACCESSORY DRIVE PROVISIONS for BR700-710C4-11:

	Direction* of Rotation	Transmission Ratio	Torque daNcm (lbs/in)	Weight kg (lbs)	Static Overhang Moment daNcm (lbs/in)	Maximum Power Extraction kW (hp)
Hydraulic Pump No. 2	CCW	0.275	4180 (3700)	8.91 (19.64)	81(71.7)	18.6(24.9)
Generator (IDG)	CW	0.520	4125 (3651)	32.61 (71.9)	565 (500)	32.75(43.9)
*CW: clockwise; CCW: counterclockwise, looking normal to pad along shaft						

NOTE 7. **Operating and Service Instructions:**

	BR700-710A1-10	BR700-710A2-20
Installation Drawing and Manual	E-TR206/95 Issue 6 or later approved issues	E-TR364/95 Issue 1 or later approved issues
Operating Instructions	OI-710-1BR	OI-710-2BR
Maintenance Manual	M-710-1BR	M-710-2BR
Engine Manual	E-710-1BR	E-710-2BR
Time Limits Manual	T-710-1BR	T-710-2BR

	BR700-710C4-11
Installation Drawing and Manual	E-TR240/01-(FR)-ISS01 or later approved issues
Operating Instructions	OI-710-4BR
Maintenance Manual	M-710-4BR
Engine Manual	E-710-4BR
Time Limits Manual	T-710-4BR

Service bulletins, structural repair manuals, vendor manuals, aircraft flight manuals, and overhaul and maintenance manuals which contain a statement that the document is LBA approved are accepted by the FAA and are considered FAA approved. These approvals pertain to the type design only

NOTE 8. The engines are equipped with a thrust reverser:

BR700-710A1-10: P/N 04G0001-039 (left hand engine) and P/N 04G0001-041 (right hand engine) or later approved standards.
BR700-710A2-20: P/N 07G0001-005 (left hand engine) and P/N 07G0001-007 (right hand engine) or later approved standards.
BR700-710C4-11: P/N 25G0001-001 (left hand engine) and P/N 25G0001-003 (right hand engine) or later approved standards.

Operation of these thrust reversers is approved for ground use only. Use for power back is not approved.

NOTE 9. The BR700-710 series engines meets Federal Aviation Administration requirements for adequate turbine disk integrity and rotor blade containment and does not require external armoring. Certain engine parts are life limited. These limits are listed in the BR710 Time Limits Manual.

NOTE 10. **FADEC**:

BR700-710A1-10: EEC P/N 1501KDC01-817 or later approved standards.
BR700-710A2-20: EEC P/N 1520KDC01-605, or later approved standards.
BR700-710C4-11: EEC P/N 1505KDC01-002, or later approved standards.

The EEC software has been developed and verified in accordance with RTCA/DO-178B respectively ED-12B.

NOTE 11. Lightning and EMI protection capability of the electronic engine control system, are specified in the BR700-710A1-10, BR700-710A2-20, and BR700-710C4-11 Installation Manuals.

NOTE 12. Deleted.

NOTE 13. Information on engine operation with FADEC system dispatch limitations is contained in report E-TR361/96 (FR) Issue 00 or later approved issues for BR700-710A1-10 and Report E-TR737/96 (FR) Issue 1 or later approved issues for the BR700-710A2-20, and report E-TR080/02-(FR)-ISS01, or later approved issues, for the BR700-710C4-11.

NOTE 14. The engine meets the smoke and hydrocarbon emission requirements of FAR 34 and the carbon monoxide and nitrogen oxide requirements of International Civil Aviation Organization Standards.

NOTE 15. The BR710 engine meets the fuel venting emissions requirements of FAR 34.

NOTE 16. Approved fuels and fuel additives are listed in the latest applicable issue of the applicable BR710 Operating Instructions.

NOTE 17. Approved oils are listed in the latest applicable issue of the applicable BR710 Operating Instructions.

NOTE 18. Use of take-off thrust for more than five minutes (not to exceed ten minutes) is approved for use only in the event of an inoperative engine due to shutdown or failure.

NOTE 19. The maximum permissible engine inlet distortion limit is specified in the applicable BR710 Installation Manual.

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